PURPOSE

- Translate part of roadmap into a concept for the Board's discussion.

NIEHS
The National Institute of Environmental Health Sciences
The National Institutes of Health
The Department of Health and Human Services

NTP
The National Toxicology Program
The Department of Health and Human Services

CONCEPT

Use automated techniques in present and future NTP contracts.

Apply to assays involving isolated cells or whole organisms if they are adaptable to automated technology.

Most of these assays will measure endpoints related to human disease. The NTP will initially focus on cancer and reproductive toxicity.

MISSION

NTP tests chemicals in the environment for their toxicity and for mechanisms of action

PROBLEM

Large number (80000) of chemicals in commerce

Complexity of environmental exposure

TECHNICAL ADVANCES

AUTOMATED TECHNIQUES

- Used for routine and repetitive procedures such as liquid handling and measurements
- Advantages

  Reproducibility
  Speed (Salmonella (12/mo vs. HT 400 / mo)

USAGE

- Used by pharmaceutical industry for drug discovery, e.g. inhibition of cytochrome P450 linked to drug interactions or multiplexed assays to measure gene expression, proteins, etc.
- Not generally used for mechanistic toxicity studies by pharmaceutical industry

BENEFITS OF ROBOTICS

- Produce greater numbers of test results
- Optimize specific assays for chemical examined
- Large database will better guide further research and testing

PROGRAM SIGNIFICANCE

AUTOMATED TECHNIQUES

- Test greater number of chemicals, metabolites and structural analogs.
- Provide a realistic view of assay output based on an unbiased chemical selection process.
- Evaluate many test conditions (high volume experimentation).
- Test complex mixtures.
- Evaluate databases of various combinations of assays for assessing testing priorities.

SOME AVAILABLE ASSAYS

- Cell Cycle
- Cell Motility
- Cell Viability
- Cyto-Cell Membrane
- Cyto-Nuc Translocation
- Micronucleus
- Mitotic Index